



***Solar Terrestrial Relations Observatory (STEREO)
Pre-Phase-A Requirements Review***



Power Subsystem

Jason E. Jenkins

**The Johns Hopkins University
Applied Physics Laboratory
11100 Johns Hopkins Road
Laurel, MD 20723-6099**



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Overall

- The power subsystem shall provide an unregulated 22 to 35 volts to the spacecraft. Load shedding of instruments at 25 volts
- The power subsystem shall support a nominal maximum power of 393 watts and 484 watts peak during propulsion event.
- Power system electronics and battery designs shall be identical between both spacecraft. Solar array mechanical and electrical interfaces shall be identical between both spacecraft.



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Power System Electronics

- Shall not require continuous ground intervention for normal operation
- Capabilities shall be incorporated in the power system to ON/OFF control the power to the instruments



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Solar Array

- Shall support two-year operation with all systems powered with maximum off-Sun pointing of 5°.
- The solar arrays of the two spacecraft shall support spacecraft to Sun distance variations between 0.85 and 1.03 AU for the leading spacecraft and between 0.99 and 1.18 AU for the trailing spacecraft.
- Total radiation dosage at maximum power point with 6 mil CMX cover glass: 1.4E+14, 1-Mev electron equivalent.
- Shall be tolerant to being partially shadowed.
- Shall have no gimbals and no intra-panel hinge.
- Electrostatic cleanliness requirement to be defined.



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Battery

- Shall not restrict launch window
 - Desired time from final reconditioning to launch <14 days
 - Required time from final reconditioning to launch <28 days
- Shall provide power through T –3 min to acquisition +10 min
- Shall support the solar array in providing the peak load requirements of the spacecraft



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Load Power Budget

Stereo Power Budget Revision 7 11 Nov 1998				
Subsystem/ Component	Average power	Aggregate power	Solar only peak normal ops	Battery required propulsion events
Instruments	52	70	70	70
EPD	2	2	X	X
HI	15	20	X	X
Mag	2	2	X	X
RBT	4	12	X	X
SCIP	15	20	X	X
SWPA	2	2	X	X
SWPA Electronics	2	2	X	X
DPU	10	10	X	X
IEM	57	61.6	67.0	67.0
C&DH Processor		10.4	X	X
C&T Subsystem		2.7	X	X
SSR (3 of 3)		16.5	X	X
Downlink Subsystem		5.0	X	X
Uplink Subsystem		7.0	X	X
RIU (5 of 5)		1.5	X	X
DC/DC Conv. (70% eff)		18.5	18.5	18.5

Subsystem/ Component	Average power	Aggregate power	Solar only peak normal ops	Battery required propulsion events
RF	80.8	80.8	80.8	80.8
SSPA	80	80	X	X
USO	0.8	0.8	X	X
G&C	74.5	125.5	74.5	125.5
AIE	7	7	X	X
G&CC	20	20	X	X
RWA	9	60	9	60
ST	12.5	12.5	X	X
Gyro	25	25	X	X
Sun Sensor	1	1	X	X
Propulsion	3.5	56	6.0	51.0
Pressure sensor (2 of 2)	1	1	X	X
HPLV	0	25	non-simultaneous	
Thrusters (1 of 4)	0	25		2
Tank heater	2.5	5	X	
Thermal	5	20	20	0
Heaters	5	20	X	
Power	13.1	19.3	19.3	19.3
PSE	13.1	19.3	X	X

System total	328	404
Allocated margin	20.0%	20.0%
Required total	393	484



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Power Architecture Trade-Off

Ongoing trade-offs:

- Power system topology: Peak power tracker (baseline) versus regulated direct energy transfer (DET) system.
- Multi-junction versus single junction GaAs/Ge solar cells
- NiCd (baseline) versus Li-ion
- Evaluating electrostatic cleanliness (conductive array surfaces) requirements impact



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IEM Power Converter

- The IEM power converters shall be on cards which plug into the IEM motherboard.
- The output voltages, regulation and power requirements are to be determined